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# CHILDREN'S VULNERABILITY TO TOXIC SUBSTANCES IN THE ENVIRONMENT

## Science To Achieve Results Program

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### *1999 Grants For Research*

**Opening Date: June 30, 1998**

**Closing Date: September 30, 1998**

# ***Children's Vulnerability To Toxic Substances In The Environment***

## ***Science to Achieve Results Program: 1999 Research Grants***

**Opening Date: June 30, 1998**

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### ***Introduction***

In this announcement the U.S. Environmental Protection Agency (EPA), Office of Research and Development (ORD), invites research grant applications in the following area of special interest to its mission:

#### **Children's Vulnerability to Toxic Substances in the Environment**

This invitation provides relevant background information, summarizes EPA's interest in this topic area, and describes the application and review process. This Request for Applications (RFA) describes a programmatic area which is a part of the EPA 1999 solicitation. Additional program topic areas and joint programs with the National Science Foundation and other agencies will be announced separately.

### ***EPA Mission and R & D***

#### ***Strategy***

The mission of EPA is to protect both environmental quality and human health through effective regulations and other policy initiatives. Achievement of this mission requires the application of sound science to assessment of environmental problems and to evaluation of possible solutions. A significant challenge is to support both long-term research that anticipates future environmental problems as well

as research that fills gaps in knowledge relevant to meeting current Agency goals. Requests for Applications issued by the Science to Achieve Results (STAR) Program are an important mechanism for promoting a sound scientific foundation for environmental protection.

EPA's research programs focus on reduction of risks to human health and ecosystems and on the reduction of uncertainty associated with risk assessment. Through its laboratories and through grants to academic and other not-for-profit institutions, EPA promotes research in both domains, according the highest priority to those areas in which risk assessors are most in need of new concepts, methods, and data. EPA also fosters the development and evaluation of new risk reduction technologies across a spectrum, from pollution prevention through end-of-pipe controls to remediation and monitoring. In all areas, EPA is interested in research that recognizes issues relating to environmental justice, the concept of achieving equal protection from environmental and health hazards for all people without regard to race, economic status, or culture.

EPA's extramural research grant programs are administered by ORD's National Center for Environmental Research and Quality Assurance (NCERQA).

## RESEARCH TOPIC

### ***CHILDREN'S VULNERABILITY TO TOXIC SUBSTANCES IN THE ENVIRONMENT***

#### ***Background***

Over the past few years, public attention has increasingly focused on potential adverse health effects in children from exposure to pesticides and other toxic chemicals in their food, water, or environment. Public health officials and physicians are being asked to assess the significance of a plethora of possible risks for children. At the Federal level, recent actions by the President, the Congress, and the EPA Administrator have focused attention on environmental health threats to children. In 1997, President Clinton issued an Executive Order addressing protection of children from environmental health risks. The Food Quality Protection Act of 1996 and the Safe Drinking Water Act of 1996 both require consideration of infants and children in risk assessments used to determine acceptable levels of environmental contaminants in food and drinking water. In 1996, Administrator Browner issued a report entitled *Environmental Health Threats to Children*<sup>1</sup> and set a Children's Agenda for EPA, calling for consideration of children's risks in all Agency actions and a greater emphasis on research to support children's risk assessments.

The health impacts of most concern are respiratory diseases, childhood cancer, immune system effects, neurotoxicology, and developmental effects. From 1982 to 1993, the prevalence, morbidity, and age-adjusted mortality rates for asthma increased significantly despite improvements in asthma diagnosis and management and improved understanding of the biology and immunology of the disease. There are a limited number of studies that suggest age-related differences in

cancer susceptibility. However, it is still difficult to assess the potential impact of these differences due to a lack of research. The immune system is of concern due to the known differences in immune structure and function between children and adults<sup>2</sup>. Exposure to some toxic chemicals such as lead, are well known to cause neurological effects in children\*. However, the potential neurological effects of other metals and chemicals such as solvents, and pesticides<sup>3</sup> are not as well understood. Finally, exposure to a variety of environmental toxicants can affect initial growth and development. In addition, exposure during crucial periods of development may have profound effects which may or may not be reversible in later life. These, among other concerns, support the need for additional research on possible environmental causes of childhood diseases.

In exploring the factors that affect health risk from exposure to toxic chemicals, it must be remembered that children are a unique sub-population. Depending on the circumstances, children may be more or less susceptible to the toxic effects of these chemicals than are adults. Risks to children may differ qualitatively or quantitatively from those to adults because of differences in their immature physiology, metabolic processes, respiratory rates, and differing levels of exposure<sup>4</sup>. Nutritional status, disease, and genetic variation can affect many of these processes, increasing or decreasing the risk from exposure to toxic substances<sup>5</sup>. The Environmental Protection Agency will sponsor research to better understand how these factors affect risk to children from exposure to toxic chemicals in the environment. Of particular interest are pesticides such as organophosphates, pyrethroids, and the triazine herbicides.

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\* *Proposals focusing exclusively on lead poisoning in children will be considered non-responsive to this RFA.*

More specifically, the EPA invites proposals which explore the assessment of intermittent and time-varied exposures as well as the biological basis for increased susceptibility among children.

#### ***Intermittent Exposures in Children***

The exposure of children to potentially toxic chemicals is generally quite different from that of adults because of differences in physical environment, activities and diet. The assessment of exposure in children and adults depends on first being able to consider all relevant exposure pathways, including dietary, drinking water, respiratory, dermal, and non-dietary oral ingestion. Exposures that occur via some of these pathways can sometimes be relatively high, but are usually not persistent and often result from human activities that are relatively rare (intermittent). Many of the differences in exposure between children and adults are associated with these types of exposure and are most often linked with the unique behavior of children.

Children's daily activities, proximity to floors, carpets, lawns, and soils, the frequency and duration of hand to mouth behaviors, and many other factors combine to form a life environment that varies with age and from child to child. Studies suggest, for example, that children's normal activities may expose them to higher levels of pesticides applied in and around the home<sup>6</sup>. Children also have greater average daily food consumption per unit body weight than do adults, and children differ in the specific foods eaten and in the relative proportions of various foods<sup>7</sup>.

Proposals that are responsive to this RFA will identify specific pollutant chemicals, pollutant sources, environmental media, and exposure pathways and will attempt to develop novel

methodologies for quantifying or assessing intermittent exposures. The chemicals and pathways chosen should represent problems or issues of environmental relevance. These proposals might utilize currently employed techniques such as telephone surveys, lab experiments, or field studies. However, the development of new and untested approaches is also encouraged. Topics of interest include, but are not limited to:

- Methods to quantify children's exposures that occur through dermal contact and/or via dietary and/or non-dietary ingestion;
- Approaches for quantifying the frequency and duration of children's activities in and around the home which might lead to significant intermittent exposures and consider factors such as age, sex, culture, geography, and climate; and
- Predictive models for estimating total human exposure, which incorporate child activity patterns and account for intermittent and time varied exposures.

It is especially important to be able to identify and ultimately characterize the nature and extent of behavioral patterns with respect to age/stage of development since infants, toddlers, and young children may exhibit great differences in exposure related to their mobility and physical development.

## ***Children's Susceptibility to Toxic Chemicals***

There are several interconnected factors that may contribute to increased vulnerability for children, depending on the toxic substance under consideration and the age of the child. Children's tissues, organs, and biological systems are still developing, with several stages of rapid growth and development occurring from infancy to adolescence. This rapid development and immaturity

of body organs and systems predisposes children to potentially more severe consequences within certain age ranges and windows of vulnerability. Differences in the absorption, metabolism, distribution, storage, and elimination of toxic chemicals that enter the body at different ages may also contribute to increased vulnerability and higher doses to target organs and tissues.

Physiological differences influence the amount of chemical that is absorbed into the body. Children have a greater surface area to body weight ratio than adults which may lead to increased dermal absorption. Comparisons of absorption through the respiratory and gastrointestinal tract between children and adults are complex and could lead to either increased or decreased risk depending on the physicochemical properties of the toxic chemical. The rate at which a substance is distributed to various organs in the body may be influenced by developmental changes. For example, a child's greater volume of extracellular water may dilute substances in this compartment. Also, circulatory flow rates are generally higher in children and may impact the distribution of toxic chemicals, and reduced plasma binding may increase a child's susceptibility to toxic effects. The metabolism and excretion of toxic chemicals in a child's body may also differ from that of adults. Developmental changes occur in liver enzyme systems that may increase or decrease the toxicity of substances in children. These developmental changes occur at different rates in the various enzyme systems with some not being completed until puberty<sup>8</sup>. The effects of these changes also depend on the chemical and how it is metabolized<sup>9</sup>.

EPA will support research into novel methods for studying the susceptibility of children to environmentally induced disease. Proposals that are responsive to this RFA will incorporate information on biological

and physiological characteristics of different age groups, the variability within particular age groups, and the mechanistic basis for increased susceptibility of children to the adverse health effects of environmental contaminants. Of particular interest are approaches that will provide a better understanding of these and other factors that contribute to increased susceptibility in children. This includes but is not limited to:

- The development of animal models for studying the toxicity of environmental contaminants which help us to understand the unique susceptibilities of children to the adverse health effects that may result from exposure to these contaminants; and
- Research on approaches for extrapolating from animal models to children, including the development of physiologically based pharmacokinetic models for animals and humans.

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### ***end notes***

1. USEPA. *Environmental Health Threats to Children*, EPA Report # EPA-175-F-96-001, 1996
2. International Life Science Institute (ILSI) *Research Needs on Age-Related Differences in Susceptibility to Chemical Toxicants*. ILSI Press, Washington, DC, 1996.
3. Chakraborti, T., et al. *Comparative Neurochemical and Neurobehavioral Effects of Repeated Chlorpyrifos Exposure in Young and Adult Rats*. *Pharmacol. Biochem. Behav.* 46:219-224, 1993.
4. Guzelian, P.S., et al. (Eds) *Similarities and Differences Between Children and Adults: Implications for Risk Assessment*. ILSI Press, Washington DC, 1992.
5. (a) World Health Organization. *Principles for Evaluating Health Risks*

from *Chemicals During Infancy and Childhood*. Environmental Health Criteria 59, Geneva: WHO, 1986. (b) Hunt, V.R., et al. Banbury Report 11: *Environmental Factor in Growth and Development*. Cold Springs Harbor Press, Plainview, NY, 1982. (c) Kacew, S. (1992). General Principles in Pharmacology and Toxicology Applicable to Children. In: *Similarities and Differences Between Children and Adults: Implications for Risk Assessment*. ILSI Press, Washington DC, 1992. (d) Spielberg, S.P. (1992) Subpopulation Risk: Interaction of Development and Genetics, In: *Similarities and Differences Between Children and Adults: Implications for Risk Assessment*. ILSI Press, Washington DC, 1992.

6. Fenske, R. et al. *Potential Exposure and Health Effects of Infants Following Residential Pesticide Applications*. Am. J. Public Health 80:689-693, 1990.

7. NAS (1993). *Pesticides in the Diets of Infants and cChildren*. National Academy Press, Washington DC.

8. Bearer, C.F. *How are Children Different from Adults?* Env. Health Perspectives. 103 (supplement 6): 7-12, 1995.

9. (a) Abel, S.R. et al. (1990). Chloramphenicol. In: Kacew, S. (Ed.), *Drug Toxicity and Metabolism in Pediatrics*. CRC Press, Boca Raton, FL. (b) Snodgrass, W.R. (1992) Physiological and Biochemical Differences Between Children and Adults as Determinants of Toxic Response to Environmental Pollutants, In: *Similarities and Differences Between Children and Adults: Implications for Risk Assessment*. ILSI Press, Washington DC

## Funds Available

Subject to the availability of funds, approximately \$5 million is expected to be awarded in fiscal year 1999 in this program area. The projected award range is \$150,000 to \$250,000/year for up to 3 years.

## Eligibility

Academic and not-for-profit institutions located in the U.S., and state or local governments, are eligible under all existing authorizations. Profit-making firms are not eligible to receive grants from EPA under this program. Federal agencies, national laboratories funded by federal agencies (FFRDCs), and federal employees are not eligible to submit applications to this program and may not serve in a principal leadership role on a grant.

FFRDC employees may cooperate or collaborate with eligible applicants within the limits imposed by applicable legislation and regulations. They may participate in planning, conducting, and analyzing the research directed by the principal investigator, but may not direct projects on behalf of the applicant organization or principal investigator. The principal investigator's institution may provide funds through its grant from EPA to a FFRDC for research personnel, supplies, equipment, and other expenses directly related to the research. However, salaries for permanent FFRDC employees may not be provided through this mechanism.

Federal employees may not receive salaries or in other ways augment their agency's appropriations through grants made by this program. However, federal employees may interact with grantees so long as their involvement is not essential to achieving the basic goals of the grant\*\* The principal investigator's institution may also subcontract to a federal agency to

purchase unique supplies or services unavailable in the private sector. Examples are purchase of satellite data, census data tapes, chemical reference standards, analyses or instrumentation not available elsewhere, etc. A written justification for federal involvement by subcontract must be included in the application, along with an assurance from the federal agency involved which commits it to supply the specified service.

*\*\*EPA encourages interaction between its laboratory scientists and grant principal investigators for the purpose of exchanging information in research areas of common interest that may add value to their respective research activities. However, this interaction must be incidental to achieving the goals of the research under a grant. If the involvement should become substantial, i.e., essential to achieving these goals, then the award would become a cooperative agreement. Interaction that is "incidental" is not reflected in a research proposal and involves no resource commitments.*

Potential applicants who are uncertain of their eligibility should contact Dr. Robert E. Menzer in NCERQA, phone (202) 564-6849, EMail: [menzer.robert@epamail.epa.gov](mailto:menzer.robert@epamail.epa.gov)

## Standard Instructions for Submitting an Application

This section contains a set of special instructions on how applicants should apply for an NCERQA grant. Proposed projects must be for research designed to advance the state of knowledge in the research areas described in this solicitation.

### Sorting Codes

In order to facilitate proper assignment and review of applications, each applicant is asked to identify the topic area in which the application is to be considered. **It is the responsibility of the applicant to correctly identify the proper sorting code.** Failure to do so will result in an inappropriate peer review assignment. At various places within the application, applicants will be asked to identify this topic area by using the appropriate Sorting Code. The Sorting Code for the *Children's Vulnerability to Toxic Substances in the Environment* is **99-NCERQA-B1**. Applications are due by **September 30, 1998**.

The Sorting Code must be placed at the top of the abstract (as shown in the abstract format), in Box 10 of Standard Form 424 (as described in the section on SF424), and should also be included in the address on the package that is sent to EPA (see the section on **How to Apply**).

### The Application

The initial application is made through the submission of the materials described below. **It is essential that the application contain all the information requested and be submitted in the formats described.** If an application is considered for award, (i.e., after external peer review and internal review) additional forms and other information will be requested by the Project Officer. **The applica-**

**tion should not be bound or stapled in any way.** The Application contains the following:

- A. Standard Form 424:** The applicant must complete Standard Form 424 (see attached form and instructions). This form will act as a cover sheet for the application and **should be its first page.** Instructions for completion of the SF424 are included with the form. The form must contain the original signature of an authorized representative of the applying institution. Please note that both the Principal Investigator and an administrative contact should be identified in Section 5 of the SF424.
- B. Key Contacts:** The applicant must complete the Key Contacts Form (attached) as the **second page** of the submitted application.
- C. Abstract:** The abstract is a very important document. Prior to attending the peer review panel meetings, some of the panelists may read only the abstract. Therefore, it is critical that the abstract accurately describe the research being proposed and convey all the essential elements of the research. Also, in the event of an award, the abstracts will form the basis for an Annual Report of awards made under this program. The abstract should include the following information, as indicated in the example format provided:
  - 1. Sorting Code:** Use **99-NCERQA-B1**.
  - 2. Title:** Use the exact title as it appears in the rest of the application.
  - 3. Investigators:** List the names and affiliations of each investigator who will significantly contribute to the project. Start with the Principal Investigator.
  - 4. Project Summary:** This should summarize: (a) the **objectives** of the study (including any hypotheses that will be tested), (b) the experimental **approach** to be used (which should give an accurate description of the project as described in the proposal), (c) the **expected results** of the project and how it addresses the research needs identified in the solicitation, and (d) the estimated **improvement in risk assessment or risk management** that will result from successful completion of the work proposed.
  - 5. Supplemental Keywords:** A list of suggested keywords is provided for your use. Do not duplicate terms already used in the text of the abstract.
- D. Project Description:** This description must not exceed fifteen (15) consecutively numbered (center bottom), 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins. The description must provide the following information:
  - 1. Objectives:** List the objectives of the proposed research and the hypotheses being tested during the project and briefly state why the intended research is important. This section can also include any background or introductory information that would help explain the objectives of the study (one to two pages recommended).
  - 2. Approach:** Outline the methods, approaches, and techniques that you intend to employ in meeting the objective stated above (five to 10 pages recommended).
  - 3. Expected Results or Benefits:** Describe the results you expect to achieve during the project, the benefits of success as they relate to the topic under which the proposal was submitted, and the potential recipients of these

benefits. This section should also discuss the utility of the research project proposed for addressing the environmental problems described in the solicitation (one to two pages recommended).

**4. General Project Information:** Discuss other information relevant to the potential success of the project. This should include facilities, personnel, project schedules, proposed management, interactions with other institutions, etc. (one to two pages recommended).

**5. Important Attachments:** Appendices and/or other information may be included but must remain within the 15-page limit. References cited are in addition to the 15 pages.

**E. Resumes:** The resumes of all principal investigators and important co-workers should be presented. Resumes must not exceed two consecutively numbered (bottom center), 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins for each individual.

**F. Current and Pending Support:** The applicant must identify any current and pending financial resources that are intended to support research related to that included in the proposal or which would consume the time of principal investigators. This should be done by completing the appropriate form (see attachment) for each investigator and other senior personnel involved in the proposal. Failure to provide this information may delay consideration of your proposal.

**G. Budget:** The applicant must present a detailed, itemized budget for the entire project. This budget must be in the format provided in the example (see attachment) and not exceed two consecutively

numbered (bottom center), 8.5x11-inch pages with 1-inch margins. Please note that institutional cost sharing is not required and, therefore, does not have to be included in the budget table. If desired, a brief statement concerning cost sharing can be added to the budget justification.

**H. Budget Justification:** This section should describe the basis for calculating the *personnel*, *fringe benefits*, *travel*, *equipment*, *supplies*, *contractual support*, and *other* costs identified in the itemized budget and explain the basis for their calculation (special attention should be given to explaining the *travel*, *equipment*, and *other* categories). This should also include an explanation of how the indirect costs were calculated. This justification should not exceed two consecutively numbered (bottom center), 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins.

**I. Quality Assurance Narrative Statement:** For any project involving data collection or processing, conducting surveys, environmental measurements, and/or modeling, provide a statement on how quality processes or products will be assured. This statement should not exceed two consecutively numbered, 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins. This is in addition to the 15 pages permitted for the Project Description. The Quality Assurance Narrative Statement should, for each item listed below, either present the required information or provide a justification as to why the item does not apply to the proposed research. For awards that involve environmentally related measurements or data generation, a quality system that complies with the requirements of

ANSI/ASQC E4, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs," must be in place.

1. The activities to be performed or hypothesis to be tested (reference may be made to the specific page and paragraph number in the application where this information may be found); criteria for determining the acceptability of data quality in terms of precision, accuracy, representativeness, completeness, comparability.
2. The study design, including sample type and location requirements and any statistical analyses that were used to estimate the types and numbers of samples required for physical samples or similar information for studies using survey and interview techniques.
3. The procedures for the handling and custody of samples, including sample identification, preservation, transportation, and storage.
4. The methods that will be used to analyze samples or data collected, including a description of the sampling and/or analytical instruments required.
5. The procedures that will be used in the calibration and performance evaluation of the sampling and analytical methods used during the project.
6. The procedures for data reduction and reporting, including a description of statistical analyses to be used and of any computer models to be designed or utilized with associated verification and validation techniques.

7. The intended use of the data as they relate to the study objectives or hypotheses.
8. The quantitative and or qualitative procedures that will be used to evaluate the success of the project.
9. Any plans for peer or other reviews of the study design or analytical methods prior to data collection.

ANSI/ASQC E4, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" is available for purchase from the American Society for Quality Control, phone 1-800-248-1946, item T55. Only in exceptional circumstances should it be necessary to consult this document.

- J. Postcard:** The Applicant must include with the application a self-addressed, stamped 3x5-inch post card. This will be used to acknowledge receipt of the application and to transmit other important information to the applicant.

## *How to Apply*

The original and **ten (10)** copies of the fully developed application and **five (5)** additional copies of the abstract (**15 in all**), must be received by NCERQA no later than **4:00 P.M. EDT on September 30, 1998**.

The application and abstract must be prepared in accordance with these instructions. Informal, incomplete, or unsigned proposals will not be considered. The application should not be bound or stapled in any way. The original and copies of the application should be secured with paper or binder clips. Completed applications should be sent via regular mail to:

U.S. Environmental Protection Agency  
Peer Review Division (8703R)  
Sorting Code: 99-NCERQA-B1  
401 M Street, SW  
Washington DC 20460

For express mail or courier-delivered applications, the following address must be used:

*U. S. Environmental Protection Agency  
Peer Review Division (8703R)  
Sorting Code: 99-NCERQA-B1  
1300 Pennsylvania Avenue, NW  
Room B-10105  
Washington, DC 20004*

Phone: (202) 564-6939 (for express mail applications)

The sorting code must be identified in the address (as shown above).

## *Guidelines, Limitations, and Additional Requirements*

Proposals must be submitted to only one topic area, using a single sorting code. Proposals submitted to more than one RFA topic will be assigned to the topic designated on the first version received or to the first sorting code designated on the application. If you wish to submit more than one application to the STAR Program, you must ensure that the research proposed in each is significantly different from any that has been submitted to this solicitation or from any other grant you are currently receiving from EPA or any other federal government agency.

Projects which contain subagreements or subcontracts constituting more than 40% of the total direct cost of the grant for each year in which the subcontract is awarded will be subject to special review and may require additional justification.

Researchers will be expected to budget for and participate in an annual All-Investigators Meeting with EPA scientists and other grantees to report on research activities and to discuss issues of mutual interest.

## *Review and Selection*

All grant applications are initially reviewed by EPA to determine their legal and administrative acceptability. Acceptable applications are then reviewed by an appropriate technical peer review group. This review is designed to evaluate each proposal according to its scientific merit. In general, each review group is composed of non-EPA scientists, engineers, social scientists, and/or economists who are experts in their respective disciplines and are proficient in the technical areas they are reviewing. The reviewers use the following criteria to help them in their reviews:



1. The originality and creativity of the proposed research, the appropriateness and adequacy of the research methods proposed, and the appropriateness and adequacy of the Quality Assurance Narrative Statement. Is the research approach practical and technically defensible, and can the project be performed within the proposed time period? Will the research contribute to scientific knowledge in the topic area of the solicitation? Is the proposal well-prepared with supportive information that is self-explanatory and understandable?

2. The qualifications of the principal investigator(s) and other key personnel, including research training, demonstrated knowledge of pertinent literature, experience, and publication records. Will all key personnel contribute a significant time commitment to the project?

3. The availability and/or adequacy of the facilities and equipment proposed for the project. Are there any deficiencies that may interfere with the successful completion of the research?

4. The responsiveness of the proposal to the research needs identified for the topic area. Does the proposal adequately address all of the objectives specified for this topic area?

5. Although budget information is not used by the reviewers as the basis for their evaluation of scientific merit, the reviewers are asked to provide their view on the appropriateness and/or adequacy of the proposed budget and its implications for the potential success of the proposed research. Input on requested equipment is of particular interest.

Applications that receive scores of excellent and very good from the peer reviewers are subjected to a programmatic review within EPA, the object being to assure a balanced research portfolio for the Agency. Scientists from the ORD Laboratories and EPA Program and Regional Offices review these applications in relation to program priorities and their complementarity to the ORD intramural program and recommend selections to NCERQA.

Funding decisions are the sole responsibility of EPA. Grants are selected on the basis of technical merit, relevancy to the research priorities outlined, program balance, and budget. A summary statement of the scientific review by the peer panel will be provided to each applicant. Normally, applicants are notified about award decisions within 6 months of the application deadline.

Applications selected for funding will require additional certifications, possibly a revised budget, and responses to any comments or suggestions offered by the peer reviewers. Project officers will contact principal investigators to obtain these materials.

### ***Proprietary Information***

By submitting an application in response to this solicitation, the applicant grants EPA permission to share the application with technical reviewers both within and outside of the Agency. Applications containing proprietary or other types of confidential information will be returned to the applicant without review.

### ***Funding Mechanism***

The funding mechanism for all awards issued under this solicitation will consist of grants from EPA and depends on the availability of funds. In accordance with Public Law 95-224, the primary purpose of a grant is to

accomplish a public purpose of support or stimulation authorized by Federal statute rather than acquisition for the direct benefit of the Agency. In issuing a grant agreement, EPA anticipates that there will be no substantial EPA involvement in the design, implementation, or conduct of the research funded by the grant. However, EPA will monitor research progress, based in part on annual reports provided by awardees.

### ***Contacts***

Additional general information on the STAR Program, forms used for applications, etc., may be obtained by exploring our Web page at <<http://www.epa.gov/ncerqa>>. EPA does not intend to make mass-mailings of this announcement. Information not available on the Internet may be obtained by contacting:

U.S. Environmental Protection Agency  
National Center for Environmental  
Research and Quality Assurance  
(8703R)  
401 M Street, SW  
Washington DC 20460

Phone: 1-800-490-9194

In addition, a contact person has been identified below for this topic. He will respond to inquiries regarding the solicitation and can respond to any technical questions related to your application.

#### **Children's Vulnerability to Toxic Substances in the Environment**

- Chris Saint 202-564-6909  
saint.chris@epamail.epa.gov

# APPLICATION FOR FEDERAL ASSISTANCE

<b>1. TYPE OF SUBMISSION</b> <i>Application</i> <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction		<i>Preapplication</i> <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction		<b>2. DATE SUBMITTED</b>		Applicant Identifier	
				<b>3. DATE RECEIVED BY STATE</b>		State Applicant Identifier	
				<b>4. DATE RECEIVED BY FEDERAL AGENCY</b>		Federal Identifier	
<b>5. APPLICANT INFORMATION</b> IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, LIST ACRONYM(S)							
Legal Name:				Organizational Unit:			
Address (give city, county, state, and zip code):				Name and telephone and E-mail number of the person to be contacted on matters involving this application (give area code) PI:  ADMIN. CONTACT:			
<b>6. EMPLOYER IDENTIFICATION NUMBER (EIN):</b> <div style="border: 1px solid black; display: inline-block; width: 100px; height: 20px; margin: 5px;"></div> - <div style="border: 1px solid black; display: inline-block; width: 100px; height: 20px; margin: 5px;"></div>				<b>7. TYPE OF APPLICANT: (enter appropriate letter in box)</b> <span style="border: 1px solid black; display: inline-block; width: 30px; height: 20px; vertical-align: middle;"></span>			
<b>8. TYPE OF APPLICATION:</b> <input type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision  If Revision, enter appropriate letter(s) in box(es): <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> A. Increase Award    B. Decrease Award    C. Increase Duration D. Decrease Duration    Other (specify): _____				A. State                      H. Independent School Dist. B. County                    I. State Controlled Institution of Higher Learning C. Municipal                J. Private University D. Township                K. Indian Tribe E. Interstate                L. Individual F. Intermunicipal           M. Profit Organization G. Special District        N. Other (Specify) _____			
				<b>9. NAME OF FEDERAL AGENCY:</b>  <div style="text-align: center;"><b>U.S. Environmental Protection Agency - ORD - NCERQA</b></div>			
<b>10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER:</b>				<b>11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:</b>   			
<div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; text-align: center; line-height: 20px;">6</div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; text-align: center; line-height: 20px;">6</div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; text-align: center; line-height: 20px;">.</div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; text-align: center; line-height: 20px;">5</div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; text-align: center; line-height: 20px;">0</div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; text-align: center; line-height: 20px;">0</div>							
TITLE: <b>99-NCERQA - _ _ _</b>							
<b>12. AREAS AFFECTED BY PROJECT (cities, counties, states, etc.):</b>  							
<b>13. PROPOSED PROJECT:</b>		<b>14. CONGRESSIONAL DISTRICTS OF:</b>					
Start Date	Ending Date	a. Applicant				b. Project	
<b>15. ESTIMATED TOTAL PROJECT FUNDING:</b>		<b>16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?</b> a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:  DATE _____  b. NO. <input type="checkbox"/> PROGRAM IS NOT COVERED BY E.O. 12372  <input type="checkbox"/> OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW					
a. Federal	\$ .00						
b. Applicant	\$ .00						
c. State	\$ .00						
d. Local	\$ .00						
e. Other	\$ .00						
f. Program Income	\$ .00	<b>17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?</b>  <input type="checkbox"/> Yes    If "Yes," attach an explanation. <input type="checkbox"/> No					
g. TOTAL	\$ .00						
<b>18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT. THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.</b>							
a. Typed Name of Authorized Representative				b. Title		c. Telephone number	
d. Signature of Authorized Representative						e. Date Signed	

## INSTRUCTIONS FOR THE SF 424

This is a standard form used by applicants as a required facesheet for preapplications and applications submitted for Federal Assistance. It will be used by Federal agencies to obtain applicant certification that States which have established a review and comment procedure in response to Executive Order 12372 and have selected the program to be included in their process, have been given an opportunity to review the applicant's submission.

- | Item: | Entry:   | Item: | Entry:  |
|-------|--|-------|---|
| 1.    | Self-explanatory.  | 12.   | List only the largest political entities affected (e.g., State, counties, cities.)  |
| 2.    | Date application submitted to Federal agency (or State, if applicable) & applicant's control number (if applicable).   | 13.   | Self-explanatory.   |
| 3.    | State use only (if applicable).  | 14.   | List the applicant's Congressional Districts and any District(s) affected by the program or project.  |
| 4.    | If this application is to continue or revise an existing award, enter present Federal identifier number. If for a new project, leave blank.  | 15.   | Amount requested or to be contributed during the first funding/budget period by each contributor. Value of in-kind contributions should be included on appropriate lines as applicable. If the action will result in a dollar change to an existing award, include <u>only</u> the amount of the change. For decreases, enclose the amounts in parentheses. If both basic and supplemental amounts are included, show breakdown on an attached sheet. For multiple program funding, use totals and show breakdown using same categories as item 15. |
| 5.    | Legal name of applicant, name of primary organizational unit which will undertake the assistance activity, complete address of the applicant, and name and telephone number of the person to contact on matters related to this application.   | 16.   | Applicants should contact the State Single Point of Contact (SPOC) for Federal Executive Order 12372 to determine whether the application is subject to the State intergovernmental review process.   |
| 6.    | Enter Employer Identification Number (EIN) as assigned by the Internal Revenue Service.  | 17.   | This question applies to the applicant organization, not the person who signs as the authorized representative. Categories of debt include delinquent audit allowances, loans and taxes.  |
| 7.    | Enter the appropriate letter in the space provided.  | 18.   | To be signed by the authorized representative of the applicant. A copy of the governing body's authorization for you to sign this application as official representative must be on file in the applicant's office. (Certain Federal agencies may require that this authorization be submitted as part of the application.)   |
| 8.    | Check appropriate box and enter appropriate letter(s) in the space(s) provided:<br><br>— "New" means a new assistance award.<br><br>— "Continuation" means an extension for an additional funding/budget period for a project with a projected completion date.<br><br>— "Revision" means any change in the Federal Government's financial obligation or contingent liability from an existing obligation. |       |   |
| 9.    | Name of Federal agency from which assistance is being requested with this application.   |       |   |
| 10.   | Use the Catalog of Federal Domestic Assistance number and title of the program under which assistance is required.   |       |   |
| 11.   | Enter a brief descriptive title of the project. If more than one program is involved, you should append an explanation on a separate sheet. If appropriate (e.g., construction or real property projects), attach a map showing project location. For preapplications, use a separate sheet to provide a summary description of this project.  |       |   |

# KEY CONTACTS FORM

- ☐ **Authorized Representative:** *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Complete Address: \_\_\_\_\_

\_\_\_\_\_

Phone Number: \_\_\_\_\_

- ☐ **Payee:** *Individual authorized to accept payments.*

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Complete Address: \_\_\_\_\_

\_\_\_\_\_

Phone Number: \_\_\_\_\_

- ☐ **Administrative Contact:** *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc.)*

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Complete Address: \_\_\_\_\_

\_\_\_\_\_

Phone Number: \_\_\_\_\_

FAX Number: \_\_\_\_\_

E-Mail Number: \_\_\_\_\_

- ☐ **Principal Investigator:** *Individual responsible for the technical completion of the proposed work.*

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Complete Address: \_\_\_\_\_

\_\_\_\_\_

Phone Number: \_\_\_\_\_

FAX Number: \_\_\_\_\_

E-Mail Number: \_\_\_\_\_

## EPA STAR Grant Abstract (*Example Format*)

**Sorting Code:** 99-NCERQA-XX (*use the correct code that corresponds to the appropriate RFA topic*)

**Title:** *Use the exact title as it appears in the rest of the application.*

**Investigators:** *List the names and affiliations of each investigator who will significantly contribute to the project. Start with the Principal Investigator.*

**Institution:** *Name of university or other applicant.*

**Project Period:** *October 1, 1999--September 30, 2001, for example.*

**Research Category:** *Enter your research topic name.*

### **Project Summary:**

**Objectives/Hypothesis:** *include a short statement on the context of the proposed research in relation to other environmental research in the particular area of work*

**Approach:** *outline the methods, approaches, and techniques you intend to employ in meeting the objectives*

### **Expected Results:**

*including a brief description of the*

**Improvements in Risk Assessment or Risk Management**

*that will be realized if the expected results are achieved*

**Supplemental Keywords:** *see attached suggestions. Do not duplicate terms used in the text of the abstract.*

## SUGGESTED KEYWORDS

**Media:** (media, air, ambient air, atmosphere, ozone, water, drinking water, watersheds, groundwater, land, soil, sediments, acid deposition, global climate, indoor air, mobile sources, CASTNET, stratospheric ozone, tropospheric, marine, estuary, precipitation, leachate, adsorption, absorption, chemical transport)

**Risk Assessment:** (exposure, risk, risk assessment, effects, health effects, ecological effects, human health, bioavailability, metabolism, vulnerability, sensitive populations, dose-response, carcinogen, teratogen, mutagen, animal, mammalian, organism, cellular, population, enzymes, infants, children, elderly, stressor, age, race, diet, metabolism, genetic pre-disposition, genetic polymorphisms, sex, ethnic groups, susceptibility, cumulative effects)

**Chemicals, toxics, toxic substances:** (chemicals, toxics, particulates, ODS, VOC, CFC, PAH, PNA, PCB, dioxin, metals, heavy metals, solvents, oxidants, nitrogen oxides, sulfates, organics, DNAPL, NAPL, pathogens, viruses, bacteria, acid rain, effluent, discharge, dissolved solids, intermediates)

**Ecosystem Protection:** (ecosystem, indicators, restoration, regionalization, scaling, terrestrial, aquatic, habitat, integrated assessment)

**Risk Management:** pollution prevention (green chemistry, life-cycle analysis, alternatives, sustainable development, clean technologies, innovative technology, renewable, waste reduction, waste minimization, environmentally conscious manufacturing); treatment (remediation, bioremediation, cleanup, incineration, disinfection, oxidation, restoration)

**Public Policy:** (public policy, decision making, community-based, cost-benefit, conjoint analysis, observation, non-market valuation, contingent valuation, survey, psychological, preferences, public good, Bayesian, socio-economic, willingness-to-pay, compensation, conservation, environmental assets, sociological)

**Scientific Disciplines:** (environmental chemistry, marine science, biology, physics, engineering, social science, ecology, hydrology, geology, histology, epidemiology, genetics, pathology, mathematics, limnology, entomology, zoology)

**Methods/Techniques:** (EMAP, modeling, monitoring, analytical, surveys, measurement methods, general circulation models, climate models, satellite, landsat, remote sensing)

**Geographic Areas:** (Northeast, central, Northwest, Chesapeake Bay, Great Lakes, Midwest, Mid-Atlantic, states: {use both full name and two letter abbreviation}, EPA Regions 1 through 10)

**Sectors:** (agriculture, business, transportation, industry {petroleum, electronics, printing, etc}): {identify 4 digit SIC codes}, service industry, food processing, etc)

## Current and Pending Support

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator:	Other agencies (including NSF) to which this proposal has been/will be submitted.
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Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> Transfer of Support
----------	----------------------------------	----------------------------------	--	--

Project/Proposal Title:

  
  

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

---

Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> Transfer of Support
----------	----------------------------------	----------------------------------	--	--

Project/Proposal Title:

  
  

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

---

Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> Transfer of Support
----------	----------------------------------	----------------------------------	--	--

Project/Proposal Title:

  
  

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

---

Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> Transfer of Support
----------	----------------------------------	----------------------------------	--	--

Project/Proposal Title:

  
  

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

---

Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> Transfer of Support
----------	----------------------------------	----------------------------------	--	--

Project/Proposal Title:

  
  

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

\*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

# Itemized Budget for EPA STAR Grant Applications (*Example Format*)

CATEGORIES	YEAR ONE	YEAR TWO	YEAR THREE	TOTAL PROJECT
<b>a. Personnel</b> Principal Investigator Co-PI Research Scientists Postdoctoral Scientists Other Personnel				
<b>TOTAL PERSONNEL COSTS</b>				
<b>b. Fringe Benefits</b> _____ % of _____				
<b>c. Travel</b> Trip 1 Trip 1 Trip 1 ...etc.				
<b>TOTAL TRAVEL COSTS</b>				
<b>d. Equipment</b> Item 1 Item 2 Item 3 ...etc.				
<b>TOTAL EQUIPMENT COSTS</b>				
<b>e. Supplies</b> Item 1 Item 2 Item 3 ...etc.				
<b>TOTAL SUPPLY COSTS</b>				
<b>f. Contracts</b> 1 2 3 ...etc.				
<b>TOTAL CONTRACTUAL COSTS</b>				
<b>g. Other</b> Item 1 Item 2 Item 3 ...etc.				
<b>TOTAL OTHER COSTS</b>				
<b>h. TOTAL DIRECT COSTS</b> (sum of a-g)				
<b>i. Indirect Costs/Charges</b> _____ % of _____ (base)				
<b>j. TOTAL PROJECT COSTS</b> (sum of h & i)				
<b>k. TOTAL REQUESTED FROM EPA</b>				